OLLSCOIL NA hÉIREANN

NATIONAL UNIVERSITY OF IRELAND, GALWAY

CHRISTMAS EXAMINATIONS, 2002

Third Year (Denominated B.Sc. Degree in Marine Science)

MR 315: Chemical and Physical Oceanography

Prof. M.J. Dring
and the internal examiners

Time allowed: *Three hours.*
Answer *four* questions, at least **ONE** from each section.

Use a **SEPARATE** answer book for each section.

SECTION A

1. ***EITHER***

a. Account for the differences in pH observed in rainwater, river waters, marine waters and hydrothermal waters.

OR

b. 'Photosynthesis links the inorganic and organic carbon cycles'. Discuss.

2. ***EITHER***

a. Describe and account for the speciation of Fe, Mn, S and N in the hydrosphere.

OR

b. What are the general requirements for an analytical method? How can we ensure that an analytical method fulfils these requirements?

3. **a.** Compare the different modes of transfer of material to the oceans.

AND

b. How are the gross inputs modified on entering the marine environment?

4. **a.** Particle formation is a precursor to, but does not ensure, removal of material from the marine environment. Discuss.

AND

b. How might you estimate particulate concentration and sedimentation rate in the marine environment?

SECTION B

5. What is the slope force, and how may the slope of isobars be estimated within the water column and at the surface? What is the use of such information?

6. **a.** Write notes about turbulent mixing in the ocean.

AND

b. What are Kelvin waves and how may they be used to explain tides in the North Sea.

7. **a.** What is meant by the group velocity of a wave and how does it differ from the phase velocity?

AND

b. A wave of length 100 m and height 2 m approaches a beach from the deep ocean. What is its group velocity?

What is its group velocity in water of depth 3m? Hence estimate the wave height at this depth.

8. Write notes about vorticity in the ocean. How may the concept of vorticity be used to explain

a. Residual flow round sandbanks.

AND

b. Shelf waves.